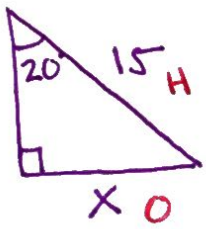
Notes — Using Trig to Find Unknowns

Steps:
1. Label sides O, A, H
2. Decide which trig function to use based on the two sides you care about

   SOH-CAH-TOA
3. Set up + solve your equation.

Ex 1:

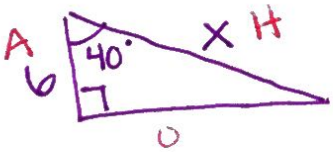


SOH $\sin\theta = \frac{O}{H}$

$15 \cdot \sin 20 = \frac{x}{15} \cdot 15$

$x = 15 \cdot \sin 20^\circ \approx 5.13$

Ex 2:

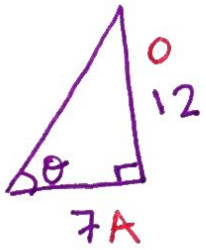


CAH $\cos\theta = \frac{A}{H}$

$\cos 40 = \frac{6}{x}$

$x = \frac{6}{\cos 40} \approx 7.83$

Ex 3:



TOA $\tan\theta = \frac{O}{A}$

$\tan\theta = \frac{12}{7}$

$\theta = \tan^{-1}\left(\frac{12}{7}\right) \approx 59.7^\circ$

Calc: 2nd tan

When finding angles, you must use the inverse trig functions

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

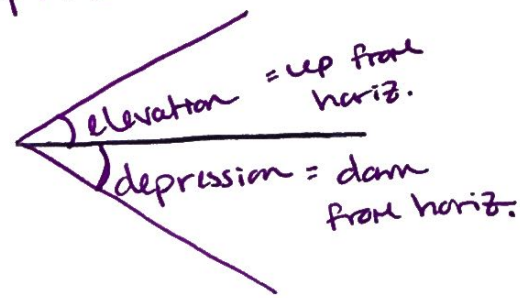
To get inside, use the inverse

Notes - Trig Word Problems

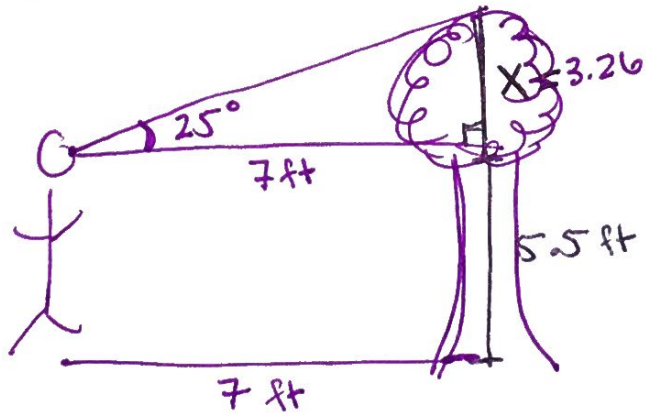
* DRAW A PICTURE!

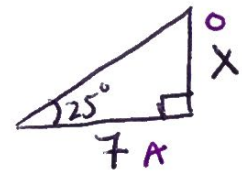
"Angle of elevation or depression"

* Always start at horizontal



Ex 1: Joe-Bob is 7 ft from the base of a tree. From his eye-level to the top of the tree, there is a 25° angle of elevation. Joe-Bob's eye level is 5.5 ft from the ground. How tall is the tree?





$7 \cdot \tan 25^\circ = \frac{x}{7} \cdot 7$

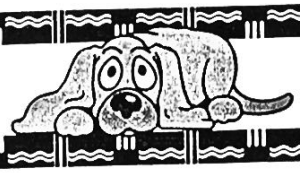
$x = 7 \cdot \tan 25 \approx 3.26$ ft

Tree height = 3.26 + 5.5

= 8.76 ft

Why Did the Professional Dog Walker Go Out of Business?

Cross out the letters above each correct answer. When you finish, write the remaining letters in the spaces at the bottom of the page.

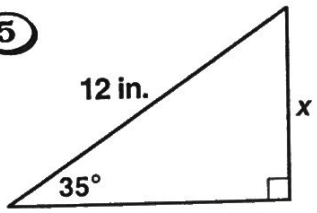


In Exercises 1-4, solve the equation. Round your solution to two decimal places.

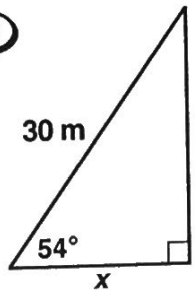
(1) $\sin 27° = \frac{x}{8}$ (2) $\tan 18° = \frac{n}{75}$ (3) $\sin 40° = \frac{4}{a}$ (4) $\cos 5° = \frac{92}{y}$

In Exercises 5-12, find the length of the side labeled *x*. Round to one decimal place.

(5)



(6)



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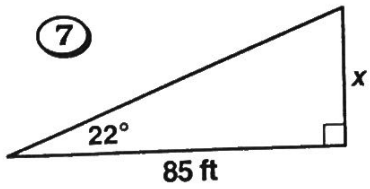

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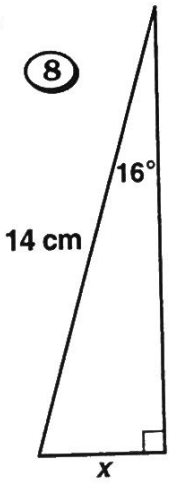

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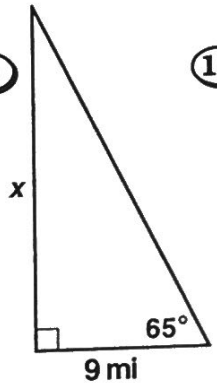

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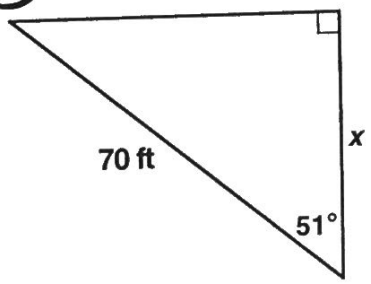
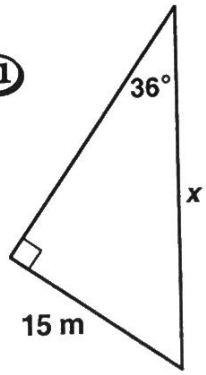
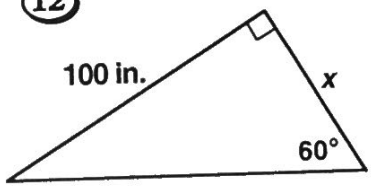


(11)

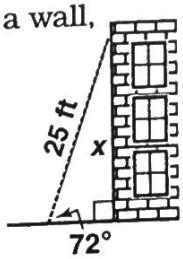


(12)

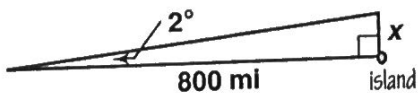


In Exercises 13-15, find the required length. Round to one decimal place.

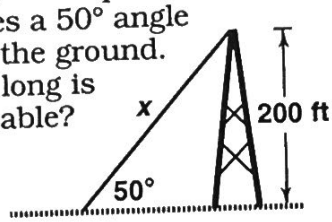
(13) When a 25-ft ladder is leaned against a wall, it makes a 72° angle with the ground. How high up on the wall does the ladder reach?



(14) A ship is sailing toward a small island 800 mi away. If the ship is 2° off course, by how many miles will it miss the island?



(15) A cable from the top of a 200-ft telephone tower makes a 50° angle with the ground. How long is the cable?

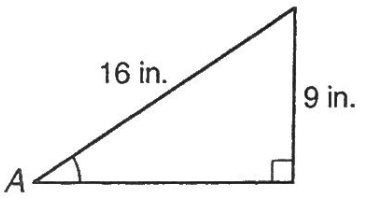


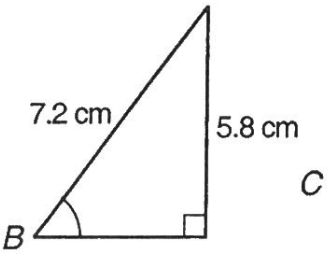
SO	**ME**	**HE**	**RE**	**AT**	**LO**	**VE**	**BE**	**FA**	**ST**	**OP**
19.3 mi	6.22	29.6 ft	57.7 in.	17.6 m	4.5 cm	261.1 ft	3.63	34.3 ft	53.4 in.	23.8 ft
HI	**GH**	**RE**	**SL**	**OW**	**IT**	**EA**	**CH**	**UP**	**CA**	**SH**
89.65	6.9 in.	44.1 ft	258.5 ft	27.9 mi	24.37	24.1 m	3.9 cm	92.35	25.5 m	21.5 mi

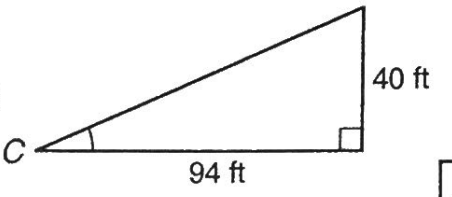
Did You Hear About . . .

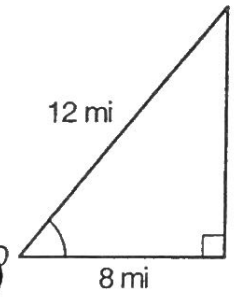
A	B	C	D	E	F	G
H	I	J	K	L	M	N ?

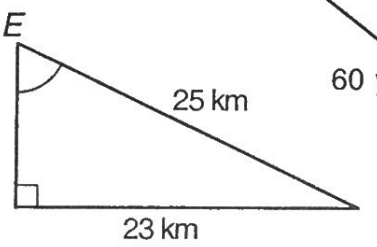
For each exercise, find the measure of the indicated angle (round to the nearest degree.) Write the word next to the correct answer in the box that contains the vertex letter.

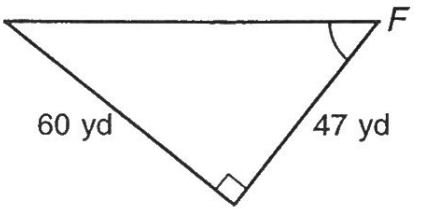


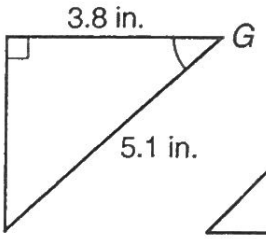


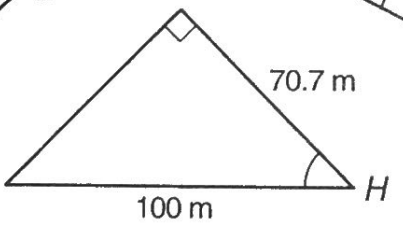


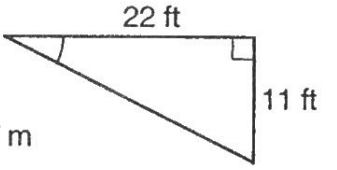


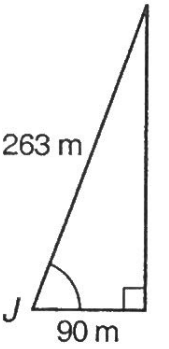




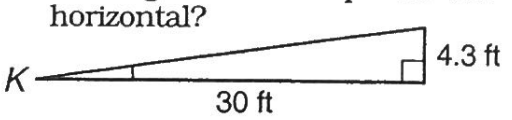




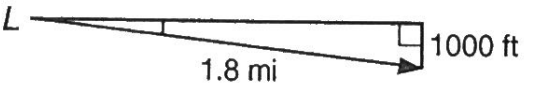




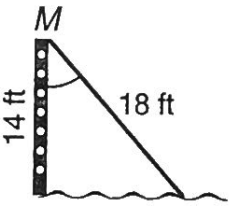
A wheelchair ramp rises 4.3 ft over a distance of 30 ft. What is the angle of the ramp with the horizontal?



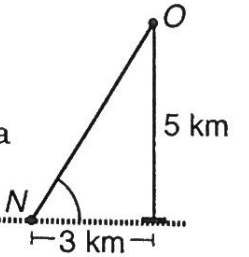
A plane descends 1000 ft while flying 1.8 mi. What is the angle of descent? (1 mi = 5280 ft)



The top of an 18-ft waterslide is 14 ft above the ground. What angle does the slide make with the vertical ladder?

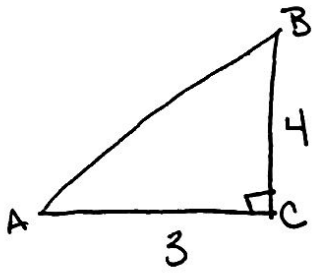


Tracking a Rocket Launch. At what angle must a camera at point *N* be aimed to photograph a rocket at point *O*?



31° • POP
23° • BOTTLE
42° • LESSONS
57° • FIZZ
8° • BECOME
52° • MUSIC
48° • THAT
37° • SONG
27° • ORDER
34° • THE
59° • LITER
10° • WIN
67° • TOOK
50° • ON
39° • BAND
54° • SODA
4° • ONE
45° • IN
6° • A
70° • TO

Trig (RTT) Test Prep

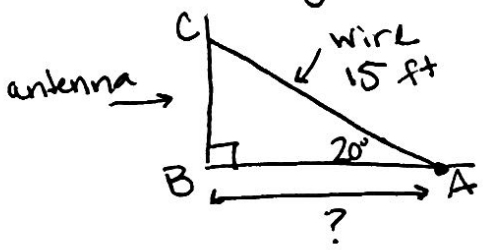
1) 

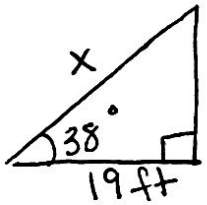
Find $\cos B$

2) The angle of elevation from a point 35 ft from the base of a tree on level ground to the top of the tree is 40°. Write an equation that can be used to find the height of the tree.

3) A 15-ft wire attached to an antenna makes a 20° angle with the level ground, as shown below.

- What is the approximate distance from the base of the antenna to the place where the wire is staked to the ground?



4) 

Write an equation and solve it for x.

5) Given that $\sin A = \frac{\sqrt{5}}{3}$ and $\cos A = \frac{-2}{3}$...

which of the following trig ratios is NOT correct?

A. $\sec A = \frac{3}{2}$

B. $\tan A = -\frac{\sqrt{5}}{2}$

C. $\cot A = -\frac{2\sqrt{5}}{5}$

D. $\csc A = \frac{3\sqrt{5}}{5}$

6) From an airplane at an altitude (height) of 1200 m, the angle of depression to a rock on the ground measures 28°. Find the distance from the plane to the rock.

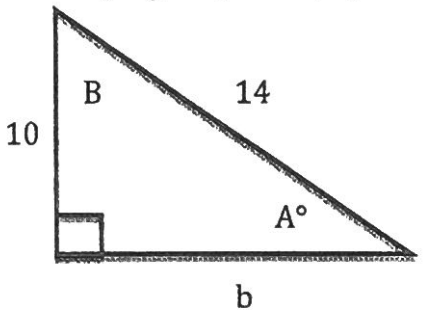
7) From a point on the ground 12 ft from the base of a flagpole, the angle of elevation of the top of the pole measures 53°. How tall is the flagpole?

8) Brian's kite is flying above a field at the end of 65 m of string. If the angle of elevation to the kite measures 70°, and Brian is holding the kite 1.2 m off the ground. How high above the ground is the kite flying?

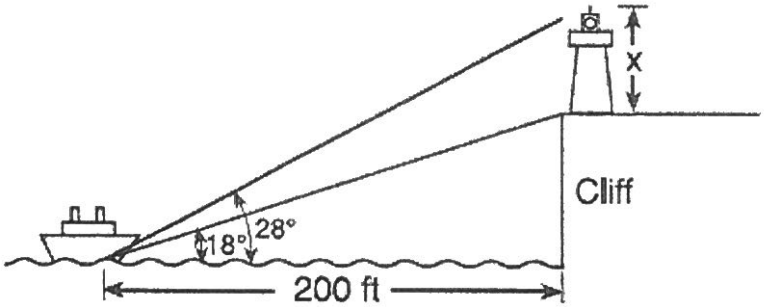
Name_____Date_____Block_____

RIGHT TRIANGLE TRIGONOMETRY

1) For the triangle given, find A, B, and b.



2) A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28°. What is the height of the lighthouse, x, to the *nearest tenth of a foot*?



Find the value of the trig function indicated.

25) Find csc θ if $\tan\theta = \frac{3}{4}$

26) Find cot θ if sec $\theta = 2$

27) Find tan θ if $\sin\theta = \frac{4}{5}$

28) Find cot θ if sec $\theta = \frac{5}{4}$

29) Find sec θ if $\sin\theta = \frac{3\sqrt{13}}{13}$

30) Find cot θ if $\sin\theta = \frac{12}{13}$

Critical think questions:

31) Draw a right triangle that has an angle with a tangent of 1.

32) Solve the triangle if $\sin B = \frac{5}{14}$